

Prevalence of *Trichomonas Vaginalis* Infection Among Married Pregnant Women in Yenagoa, Bayelsa State

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ABSTRACT

A cross-sectional survey of *Trichomonas vaginalis* infection has been conducted among married pregnant women attending antenatal clinics, for the first time in pregnancy, the direct microscopy technique was adopted. Of the 120 pregnant women studied, 4(3.3%) were infected with *T. vaginalis*. Individuals age 20-25 years were most infected (3.7%). Women in their third trimester of pregnancy were significantly more infected (1.1%), than those in their second trimester (1.6%) and first trimester (2.3%). Despite reporting a low prevalence of *T. vaginalis* among pregnant women in the study, this does not imply completely ruling out the presence of *T. vaginalis* among pregnant women due to the diagnostic technique and also that even the low occurrence among pregnant women in the hospitals cannot totally explain general occurrence. *T. vaginalis* infection can be dangerous and poses serious threat to the health. Hence, the need for prevention of *T. vaginalis* and that efforts for prevention of *T. vaginalis* infection should be targeted at all women of child bearing age. Since *T. vaginalis* is primarily sexually transmitted, educational efforts must be aimed at high risk groups including women without any formal education and must be explicit regarding the behaviours that leads to the spread of *T. vaginalis*, and other sexually transmitted infections. There is also the need for proper counseling and education on sexual behaviour and genital hygiene which would greatly help in the prevention of the infection.

Keywords: *Trichomonas vaginalis*, Pregnant women, Sexually transmitted diseases (STDs).

1.0. Introduction

1.1. Background to the Study

Trichomonads are flagellate protozoa with three to five anterior flagella. Trichomonads includes the following species: *Trichomonas vaginalis*, *Trichomonas hominis*, *Trichomonas tenax* (Nester and Anderson fourth edition). *Trichomonas vaginalis* causes the most common form of trichomoniasis in human. *Trichomonas vaginalis* belongs to the Protozoa, Sub-phylum *Sarcomastigophora* and Order *Trichomonadia*. The trichomonachloae Family in mononucleate with and axial organelle and undulating membrane.

Trichomonas vaginalis, a protozoan parasite which can be transmitted sexually, is known to be responsible for an estimated 180 million new infections per year, making it the most prevalent non-viral sexually transmitted pathogen worldwide. Petel et al (2001) in their study reported that transmission to neonates during passage through an infected birth canal is also possible. Although infection with *T. vaginalis* is frequently asymptomatic and self-limiting and can also cause urethritis in men and vaginitis in women. Soreness, dysuria, dyspareunia and irritation are usually experienced by symptomatic women with trichomoniasis (Federal Ministry of Health Nigeria, 2004). Several studies have suggested that pregnant women infected with *Trichomoniasis vaginalis* may be at increased risk of an adverse outcome. Premature labour, low birth weight, and post-abortion or post-hysterectomy infection are complications of *Trichomonal vaginitis* that have been reported (Schmid et al, 2001).

On women, symptoms can include a lot of yellow-green or grey discharge from the vagina, discomfort during sex, a bad odor coming from the vagina, burning discomfort and painful urination, irritation and itching of the genital area, and, very rarely, lower abdomen pain. Although the majority of infected men show no symptoms, others

experience scorching pain while urinating or discomfort brought on by prostate gland involvement (Nester and Eugene, 2002). *Trichomonas vaginalis* is an oval-shaped parasite that is around the size of a white blood cell (10X30mm in diameter), though its size can change depending on a person's physical health. Due to its ability to travel and directly harm the epithelium, it increases the risk of HIV transmission by causing micro-ulcerations in inhabited tissues.

The nucleus is situated on the upper pole adjacent to a parabasal body and a group of basal granules from which four, free flagella originate. A fifth flagellum accompanies a short undulating membrane along the whole length of the cell wall (Taylor, Green and Stout, 1999). The organism is a eukaryote, but like some other flagellates aerobic of micro-aerophilic flagellate, it lacks mitochondria. *Trichomonas vaginalis* has an interesting cytoplasmic organelle called hydrogenases. Transmission of *T. vaginalis* occurs by the transfer of vegetative trophozoite, mostly by the venereal route. Vaginal contamination from toilet seats, the water from toilet bowls and from fermites. It is believed that sexual intercourse is the most common source of transmission for this infection (Nester and Eugene, 2002). *Trichomonas vaginalis* infection is highly associated with the presence of sexually transmitted infections, including gonorrhea, Chlamydia and HIV. Persons with trichomoniasis are twice as likely to develop HIV infection.

Trichomoniasis has not been the subject of in-depth research or active control initiatives in Sub-Saharan Africa, particularly Nigeria, and this neglect is probably due to the generally mild nature of the infections. *T. vaginalis* has been linked to unfavorable pregnancy outcomes, but mounting data now points to the possibility that the bacterium may play a role in HIV transmission (Vishwanath, Talwar & Prasad, 2000). This therefore serves as a motivation for this study.

1.2. Objectives of the Study

The objectives of this paper are to examine the risk factors of infection in pregnancy women, to evaluate control, suggest the control, prevention and treatment of *T. vaginalis*.

2.0. Review of Related Literature

Past related literatures is considered under epidemiology, transmission and association with other STDs, immune system evasion, pathogenesis, prevention and control of *Trichomonas vaginalis*.

2.1. Epidemiology

Trichomonas vaginalis is distributed worldwide as a human parasite and has no other reservoirs. Since it lacks a cyst form, it is easily killed by drying. Therefore, transmission is usually by sexually contact. The organisms can survive for a long time on moist objects such as towels and bathtubs, so that it can occasionally be transmitted non-sexually. Nevertheless, *T. vaginalis* infections in children should at least raise the question of sexual abuse and possible exposure to other sexually transmitted disease. Newborn infants can contract the infection from infected mothers at birth (Kamel et al, 2002). There is a high percentage of asymptomatic carriers, especially among men, and this fosters transmission of the disease. Infection rates are highest in men and women with multiple sex partners. *Trichomonas* infection has been encountered in every continent and climate and has no seasonal variability. It has a cosmopolitan distribution and has been identified in all racial groups and social-economic strata (Workowski et al, 2006). The estimated incidence is over 200 million cases worldwide annually (Krieger, 2012) and at least 2 to 3

million symptomatic infections occur annually among sexually active women in the United States. The frequency of *T. vaginalis* is associated with a wide range of symptoms from a symptomatic presentation to severe sequelae (Lalik et al, 2006).

Trichomoniasis has been found in numerous investigations to be an indicator of *T. vaginalis* infection in American women. Trichomoniasis has also been linked to older age, histories of prior STI, prostitution, pregnancy, drug use, and personal health practices, suggesting that this association is likely complex (ACOG, 2006). The association with older ones contrasts with the association between age and other STIs, particularly chlamydia. Reproductive hormone levels may contribute to older women's higher frequency of trichomoniasis.

Among African women, vaginitis including Trichomonal vaginitis was significantly associated with sexual debut at less than 20 years, a partner who traveled frequently, history of STI and presence of abnormal discharge²³. Concomitant STI diagnosis is common (15-28% chlamydial co-infection and 10% gonorrheal co-infection rates) in women with Trichomoniasis, indicating the importance of screening for other STIs (Guenther, Secor and Dezzuth, 2005). *Trichomonas vaginalis* is site specific for the genitourinary tract and has been isolated from virtually all genitourinary structures. However, many women diagnosed with Trichomoniasis are asymptomatic; in Zimbabwe, 75% of women denied symptoms on direct questioning and 16% of these women had Trichomoniasis. When symptoms arise, the most common presenting complaint among women diagnosed with *T. vaginalis* is vaginal discharge, seen in more than 50% of cases, followed by pruritus or dysuria. A study of 200 Nigerian women demonstrated 74% with vaginal discharge were infected with *T. vaginalis* (Anorlu et al, 2001).

2.2. Transmission and Association with other STDs

In women, *Trichomonas vaginalis* causes inflammation of the vaginal epithelium and exocervix, while in men, it causes inflammation of the urethra. It is primarily spread during vaginal intercourse. Leukocytes, particularly HIV target cells like CD4-bearing lymphocytes and macrophages, which HIV may bind to and gain access to, are infiltrated heavily as a result of this inflammatory response. The presence of other STDs, such as gonorrhea, Chlamydia, and HIV, is strongly correlated with the infection. In the general community, trichomoniasis patients have a twofold increased risk of contracting HIV (Laga et al, 2003). There are two possible explanations for the link between *T. vaginalis* and HIV.

Respiratory or genital infection in the newborn should also be considered. One study has shown that a higher risk of pelvic inflammatory disease in women occurs with trichomoniasis (Aboyaji et al, 2003). Other studies have reported a 1.9-fold risk of tubal infertility in women with trichomoniasis (Nanda et al, 2006). *Trichomonas* may also play a role in cervical neoplasia and postoperative infection. In addition, *T. vaginalis* can frequently cause punctate mucosal hemorrhages. In an HIV negative person, both the leukocyte infiltration and genital lesions are induced. Finally, trichomoniasis facilitates spread of the HIV epidemic. One theoretical calculation concludes that infection with *T. vaginalis* increased the risk of HIV transmission by 90% in a population with 25% prevalence of trichomoniasis, approximately 20% of cases of HIV would be attributable to trichomoniasis (Sonvillo, Smith and Kerndy, 2011).

This relation could explain some of the differences in rates of HIV infection in different regions of Africa where rates of HIV infection in different regions of Africa where rates of trichomoniasis and HIV seem to be directly

proportional (Buve, Weiss and Laga, 2001). Data from studies conducted in Africa have shown an association between *Trichomonas* and HIV infection, suggesting a two-three fold increase in HIV transmission. A cross-sectional study conducted among 1,209 female sex workers in the Ivory Coast found an association between HIV and *Trichomonas* infection in bivariate analysis (Niccolai et al, 2000).

2.3. Immune System Evasion

In a hostile changing environment, *T. vaginalis* can survive and flourish. Its ability to evade the host immune system is an important aspect of pathogenesis (Pepin et al, 2001). Avoidance of complement is a strategic tactic which is used by *T. vaginalis* to overcome the human immune system. It has long been known that *T. vaginalis* activates the alternative pathway of complement, yet we are only just beginning to understand how the parasite escapes eradication.

Trichomonas vaginalis has taken the advantage of a niche in which little complement is present. Cervical mucus is surprisingly deficient in complement. Menstrual blood represents the only source of complement available to the vagina. Interestingly, its complement activity is about half that of venous blood, and about one third of menstrual blood samples have no complement-mediated cytotoxicity towards *T. vaginalis*. However, a reduction in parasite concentration is seen during menses while the number of organisms in the vagina actually decreases during menses (Mayta et al, 2000). It was found that iron was a contributing factor in complement resistance. Demes et al (2001) found that fresh isolates of *T. vaginalis* differ in their susceptibility or resistance to complement-mediated lysis in serum. It appears that complement-resistant isolates become susceptible to complement after prolonged in-vitro cultivation, which is consistent with the hypothesis that phenotypic variation allows the trichomonad to avoid complement. Resistance to complement is dependent upon a high concentration of iron (Kehker, 2000), a nutrient which is indeed abundant during menses. It seems that iron regulates the expression of complements, which have been found to degrade the C₃ portion of complement on the surface of the organism, this allows the organism to evade complement-mediated destruction.

2.4. Pathogenesis

Trichomoniasis presents a wide variety of clinical patterns. The spectrum of clinical patterns. The spectrum of clinical trichomoniasis in women ranges from the asymptomatic carrier state to flagrant vaginosis, with one-third of asymptomatic infected patients becoming symptomatic within six (6) months. *Trichomonas vaginalis* principally infects the squamous epithelium in the genital tract. The infection, once established, persists for long periods in females but only for a short time in males. It is chiefly a disease of the reproductive years and the clinical manifestation of the infection is observed before menarche or after menopause. The incubation period is 4 to 28 days in about 50% of infected individuals.

Trichomonas vaginalis has a flagellated parasitic lifestyle and is extracellular to the genitourinary tract epithelium. Its pathophysiology reveals that it is normally pyriform but can rarely take on an amoeboid shape (Harp & Chowdhury, 2011). The size of the individual organism is between 2 and 20 micrometers long. One flagellum extends backward to the center of the organism and four flagella sprout from the cell's front region, generating an undulating membrane. The posterior part of the organism has an axostyle that expands. The vast genome of *Trichomonas*

vaginalis (strain G3, 176,441,227 bp) has around 60,000 protein-coding genes arranged on six chromosomes. It is an extremely predatory obligatory parasite that eats erythrocytes, vaginal epithelial cells, and bacteria before being consumed by macrophages.

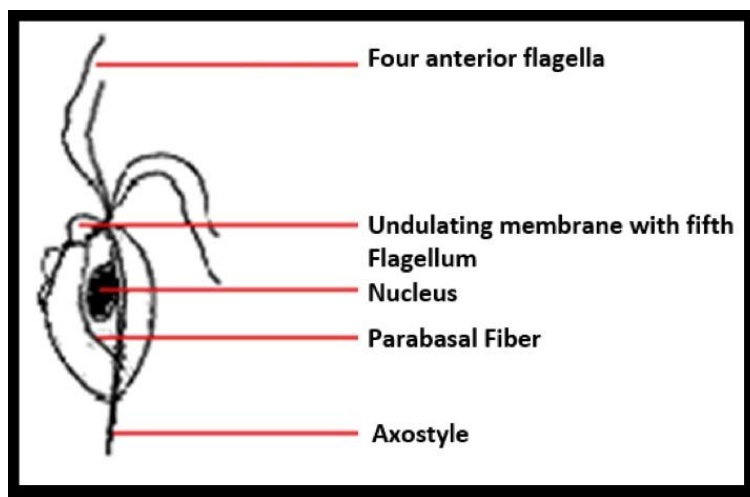


Figure 1. Diagram of *Trichomonas vaginalis*

SOURCE: Adapted from Atlas (2023)

2.5. Prevention and Control

Control of *Trichomonas vaginalis* infection always requires simultaneous treatment of both sexual partners. Abstinence from sex until the infection is cured, consistent and correct males latex condom use, put on before starting sexual intercourse and worn until the penis is withdrawn. Females should indulge in spermicide ad diaphragms practices which may provide some protection. When an individual is individual is infected, he or she should see the doctor, health professional or urologist immediately. Individuals should know each other's sexual history. Good standard of personal hygiene should also be maintained. Control of this infection necessitates examination and of necessary use of condoms are effective ways to prevent transmission (Lawing and Hedges, 2000).

Definitive therapy for trichomoniasis became possible with the introduction of nitroimidazoles (meteronidazole, tinidazole, carnidazole, and nimorazole). In a meta-analysis of nitromidazoles for treatment of trichomoniasis. In short or prolonged courses of oral therapy, parasitological cure resulted in 90% of cases. Topical metronidazole is not effective for therapy for trichomoniasis (Schmid, Narcisi, Mosune et al, 2001). The Centers for Disease Control and Prevention (CDC) has estimated that 5% of clinical isolates of *T. vaginalis* exhibited some degree of metronidazole resistance. Metronidazole resistance may predict tinidazole for the entire class of nitroimidazoles (Narcisi and Secor, 2000). The CDC has proposed and escalated therapeutic regimen for management of infection with resistant strains.

Rurazolidone, a nitrofur, was shown to be effective invitro against both laboratory and clinical specimens with high level metronidazole resistance. Metronidazole resistance may predict tinidazole resistance, however, is unclear if this situation is true for the entire class of nitromidazoles (Narcisi and Secor, 2000). The CDC has proposed an escalated therapeutic regimen for management of infection with resistant strains.

Furazolidone, a nitrofurantoin, was shown to be effective invitro against both laboratory and clinical specimens with high level metronidazole resistance, and topical paromomycin was effective in seven of 12 patients infected with resistant strains, however, paromomycin had adverse dermatological effects. Alternative for treatment of highly resistant trichomoniasis exist but have not been subjected to the rigors of clinical trials (Kigozzi et al, 2003). Side effects of nitroimidazoles include a bitter metallic taste, nausea, and vomiting, a 'disulfiram' - like reaction with ingestion of alcohol and some central nervous system effects. Despite the low doses required for treatment of trichomoniasis, side effects occur in more than half patients, especially with the metronidazole 2g dose (Krieger *et al* 2000). Risk factors for re-infection with *T. vaginalis* in HIV infected women have been evaluated.

In a study of 411 HIV positive women, 36% were re-infection of recurrent infection in these women were age 22 years and history of previous STI in multivariate analysis (Klebanoff et al, 2001). Some pregnant women with trichomoniasis may present with premature rupture of membranes, preterm labour (Lawing, Hedges and Schwebke, 2000). However, a randomized placebo controlled trial of 615 asymptomatic pregnant women with trichomoniasis did not demonstrate a difference in rates of preterm birth between the treatments and placebo groups.

3.0. Methods

The study location was Yenagoa the capital city of Bayelsa State, South-South Nigeria with a population size of about 12. The study was conducted at two major hospitals in the city with facilities for ante-natal care. The hospitals are Federal Medical Center (FMC) Yenagoa and Family Support Programme (FSP) Clinic. Samples were collected from eighty (80) samples from FMC Yenagoa and 40 samples from FSP Yenagoa and were examined for *T. vaginalis*. This sample population varied in age and social background.

The study was conducted within one month among pregnant women attending routine antenatal clinic at the selected hospitals. Approval for this study was obtained from the Ministry of Health (Director of Services). Socio-demographic information and obstetric history were obtained from participants by interview, thereafter, each subject was given a wide mouthed, leak-proof universal specimen container and was instructed on how to collect her own urine sample.

About 10mls of urine sample was obtained from each participant. Samples were also collected from the pregnant women by using a high vaginal swab stick in collection fresh samples from the vagina. The swab samples were examined soon after collection. Normal saline was dispensed into the HVS container and a smear was made on a clean dry grease free microscope slide and covered with a cover slip making sure that the preparation was not too thick so the moving organisms were easily observed and noted. The jerking characteristics motility of *Trichomonas vaginalis* was observed under the microscope using x10 and x40 magnification respectively with the condense iris diaphragm closed sufficiently to give good contrast.

3.1. Results

In Table 1, it was revealed that out of 120 pregnant women, only 4(6.6%) of them were infected with *T. vaginalis*. It was also revealed in Table 2 that out of the total of 120 pregnant women studied, pregnant women between ages 21-25 had the highest percentage of confirmed *T. vaginalis* infection and majority of them were in their third trimester.

Table 1. Prevalence of *T. Vaginalis* among specimens

Specimen	Number Examined	Number Positive	% Infected
Urine	60	1	1.6%
HVS	60	3	5.0%
Total	120	4	6.6%

Table 2. Socio-Demographic and Obstetric History with *Trichomonas vaginalis* infection

Parameters Investigated	Number Examined	Number Positive	% Positive
Age			
15-20	14	-	0.0%
21-25	24	3	3.7%
26-30	54	1	2.5%
31-35	20	-	0.0%
36-40	8	-	0.0%
Pregnancy Trimester			
First	42	1	2.3%
Second	60	1	1.6%
Third	18	2	11.1%

4.0. Conclusion

Despite reporting a low prevalence of *T. vaginalis* among pregnant women in the study, this must be interpreted with caution as the possibility of underestimation of the prevalence may not be completely ruled out due to the diagnostic technique and also that even the low occurrence is not acceptable. Studies have shown that excess of preterm births were treated with metronidazole which might be dangerous. Hence, the need for prevention of *T. vaginalis* and that efforts for prevention of *T. vaginalis* infection should be targeted at all women of child bearing age. Since *T. vaginalis* is primarily sexually transmitted, educational efforts must be aimed at high risk groups including women without any formal education and must be explicit regarding the behaviours that leads to the spread of *T. vaginalis*, and other sexually transmitted infections. There is also the need for proper counseling and education on sexual behaviour and genital hygiene which would greatly help in the prevention of the infection.

Declarations

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Competing Interests Statement

Author has declared no competing interests.

Consent for Publication

The author declares that he/she consented to the publication of this research work.

References

- [1] Atlas (2023). *Trichomonas vaginalis* - What a modern day physician should know. Scientific Figure on Research Gate.
- [2] Aboyeji, A.P., & Nwabuisi, C. (2003). Prevalence of sexually transmitted disease among pregnant women in Ilorin, Nigeria. *Journal Obstetric Gynecology*, 23: 637–639.
- [3] ACOG Practice Bulletin (2006). Clinical management guidelines for obstetrician gynecologists, Number 72.
- [4] Anorlu, R.I., Tagbenro-Beyioku, A.F., Fagorala, T., Rahman, M. (2001). Prevalence of *Trichomonas vaginalis* in patients with vaginal discharge in Lagos, Nigeria. *Nigerian Post-Graduate Medical Journal*, 8: 183–186.
- [5] Buve, A., Weiss, H.A., Laga, M., et al. (2001). The epidemiology of trichomoniasis in four African cities. *AIDS*, 15(Suppl4): 589–596.
- [6] Federal Ministry of Health Nigeria (FMHN) (2004). Technical report on 2003 National HIV/Syphilis Sentinel survey among pregnant women attending antenatal clinics in Nigeria Abuja.
- [7] Guenther, P.C., Secor, W.E., Dezutti, C.S. (2005). *T. vaginalis*. Induced epithelial monolayer disruption and human immunodeficiency virus type 1(HIV- 1) replication: implications for the sexual transmission of HIV- 1. *Infection Immunology*, 73(7): 4155–4160.
- [8] Harp, D.F. (2011). Chowdhury I. Trichomoniasis: evaluation to execution. *Eur J Obstet Gynecol Reprod Biol.*, 157(1): 3–9.
- [9] Kigozzi, G.G., Brahmabhatt, H., & Wabwire-Mangen, F. (2003). Treatment of trichomonas in pregnancy and adverse outcomes of pregnancy: A sub-analysis of a randomized Gynecology, 189: 1398–1400.
- [10] Krieger, J.N. (2012). Consider diagnosis and treatment of trichomoniasis in men (editorial, comment). *Sexually Transmitted Diseases*, 27: 241–242.
- [11] Lalik, C.J., Field, M.C., Goulding, D. & Hirt, R. (2006). Dramatic reorganization of trichomonas endomembranes during amoebal transformation: a possible role for G- proteins.
- [12] Lawing, L.F., Hedges, S.R., & Schwebke, J.R (2000). Detection of trichomoniasis in vaginal and urine specimens from women by culture and PCR. *Journal Clinical Microbiology*, 38: 3585–3588.
- [13] Niccolai, L.M, Kopicko, J.J., Kassie, A., Petros, H., Clark, R.A, Kissinger, P. (2000). Incidence and predictors of reinfection with *Trichomonas vaginalis* in HIV- infection women. *Sexually Transmitted Diseases*, 27: 284–288.
- [14] Patel, S.R., Wise, W., Patel, S.C., Ohl, C., Byrd, J.C., Estrada, C.A. (2001). Systematic review of diagnostic tests for vaginal trichomoniasis. *Infected Disease Obsteric Gynecology*, 8(5-6): 248–57.
- [15] Schmid, G.P., Nacisi, E.M., Mosure, D., (2001). Prevalence on metronidazole-resist *Trichomonas vaginalis* in a gynecology clinic. *Journal Reproductive Medicine*, 46: 545–549.

- [16] Sorvillo, F., Smith, L., & Kerndt, P. (2011). *Trichomonas vaginalis*, HIV and Africans. *Emerged Infectious Disease*, 7: 927–932.
- [17] Vishwanath, S., Talwar, V., & Prased, R., (2000). Syndromic management of vaginal discharge among women in a reproductive health clinic in India. *Sexually Transmitted Infection*, 76: 303–306.
- [18] Workowski, K.A, Berman, S.M, (2006). Sexually transmitted disease treatment guideline. *MMWR Recommended Report*, Pages 1–94.